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Review of the Rock Shrimp Fishery off the East Coast of the United States

BY

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INTRODUCTION

The following report represents a summary of landings and effort data for south Atlantic rock shrimp during the eleven year period from 1981 through 1991. Although there are several species of rock shrimp along the east coast of the United States (Williams, 1984), most are either too small in size or not abundant enough for commercial harvest. The majority of the rock shrimp landed from the east coast of the United States are Sicyonia brevirostris. The data were extracted in early 1993 from the A-10 computer located at the NMFS Southeast Fisheries Science Center in Miami, Florida. The time of data extraction is important since new data are entered and old data are edited by NMFS and State management agencies on a regular bases. The weights reported are in pounds of headed shrimp (tail weight). The dollar values are in actual dollars reported in each year. No attempt has been made to standardize the dollar values for comparison between years. The effort values in days fished as reported by the NMFS and state port agents. Days fished represent the actual time fishing and not the length of a trip (i.e., days out of port). No attempt has been made to standardize the effort data by vessel class or trawl type.

Details about the biology and the distribution of rock shrimp can be found in articles by Cobb, et al. (1973) and Kennedy, et al. (1977). These topics are not considered in this report, and the reader is referred to these publications for more information.

The purposes of this report are to summarize the current landing information on rock shrimp and to suggest possible recruitment overfishing levels that the South Atlantic Fishery Management Council (SAFMC) could use for this species. The report also will be used by the NMFS Southeast Regional Office to produce a Stock Assessment and Fishery Evaluation (SAFE) report for South Atlantic rock shrimp.

DATA SUMMARY

Catch and Landing Summary

Annual catch for rock shrimp during the 1981 through 1991 period is summarized in Figure 1. Lowest catch was in 1985 (1.11 million pounds; \$1.01 million), with highest catch in 1989 (5.40 million pounds; \$5.92 million). The mean annual catch for the eleven year period is 2.96 million pounds (standard deviation = 1.41 million pounds). No rock shrimp were reported caught along the east coast of the United States from latitudes less than 27° N or greater than 35° N (Figure 2). The majority of the rock shrimp catch each year appears to be from 28° N latitude (off Cape Canaveral, Florida). Most of the rock shrimp catch is composed of shrimp in the 46 - 55 count size (46 - 55 tails per pound) (Figure 3). More small sized shrimp than average were caught during 1983 and 1990 when compared to most of the other years.

The majority of the rock shrimp catch each year is landed in the state of Florida (Figure 4). Rock shrimp landings in Florida accounts for about 86% of the total landings each year, with Georgia landings a distant second.

Monthly catches of rock shrimp from 1981 through 1991 are summarized in Figure 5. Typically, most of the catch occurs during the latter half of each year (July through December), with peak catches in September and October. Periods of low catch are usually from April through July. Extremely high monthly catches occurred during the September - October period in both 1989 and 1990. Considerable variability is apparent in the data set (Figure 5).

Effort and CPUE Summary

Annual effort and CPUE are summarized in Figure 6 and Figure 7, respectively. These data follow the same basic trends as described above for catch. There is a good relationship ($r^2 = 0.61$) between the annual catch and effort data (Figure 8). However, the relationship between the annual CPUE and effort data is poor (non-significant r^2 value) (Figure 9). Thus, an annual

maximum sustainable yield (MSY) curve can not be produced effectively for rock shrimp (Schaefer, 1954).

Monthly effort and CPUE are summarized in Figure 10 and Figure 11, respectively. These data follow the same basic trends as described above for catch. There is a good relationship ($r^2 = 0.72$) between the monthly catch and effort data (Figure 12). However, the relationship between the monthly CPUE and effort data is poor (non-significant r^2 value) (Figure 13). Thus, a monthly maximum sustainable yield (MSY) curve can not be produced effectively for rock shrimp (Schaefer, 1954).

OVERFISHING DEFINITION

Calculation of maximum sustainable yield is not possible for the rock shrimp fishery along the east coast of the United States. Therefore, another index level must be selected upon which to base the definition of recruitment overfishing. Since it appears from the catch and effort data that recruitment overfishing has not occurred in this fishery, overfishing limits could be selected based on maximum or minimum annual values, depending on the parameter(s) selected (i.e., catch, effort or CPUE). However, once the parameter(s) have been selected, the question will remain whether recruitment overfishing will occur if this (these) selected overfishing level(s) are exceeded during a particular season. The SAFMC should provide a mechanism to allow the overfishing index level(s) to change as new data becomes available. For example, if the selected minimum parameter level drops below the current index during a particular year, and recovers the following year, the overfishing level could be adjusted to the new lower number.

Table 1 gives catch, effort and CPUE values for the years 1981 through 1991, with mean and standard deviation. Values for one and two standard deviations above and below mean values also are presented in the table. Lowest (or highest) actual value could be selected, or a value based upon the mean and standard deviation.

LITERATURE CITED

- Cobb, S. P., C. R. Futch, and D. K. Camp. 1973. The rock shrimp, Sicyonia brevirostris Stimpson, 1871 (Decapoda, Penaeidae). *Memoirs of the Hourglass Cruises* 3(1): 1-38.
- Kennedy, F. S., J. J. Crane, R. A. Schlieder, and D. G. Barber. 1977. Studies of the rock shrimp, Sicyonia brevirostris, a new fishery resource on Florida's Atlantic shelf. *Florida Marine Research Publications*, Number 27, 69 p.
- Schaefer, M. B. 1954. Some aspects of the dynamics of populations important to the management of the commercial marine fisheries. *Inter-Amer. Trop. Tuna Comm. Bull.*, 1: 25-56.
- William, A. B. 1984. Shrimps, lobsters, and crabs of the Atlantic coast of the Eastern United States, Maine to Florida. Washington, D. C., Smithsonian Institution Press, 550 p.

Table 1. Rock shrimp catch and effort statistics off east coast of United States

	YEAR	POUNDS	EFFORT	CPUE
	81	1,857,508	1,008.6	1,841.7
	82	3,154,407	1,305.7	2,415.9
	83	2,920,995	843.0	3,465.0
	84	4,112,144	1,769.5	2,323.9
	85	1,106,829	544.9	2,031.3
	86	2,058,503	1,008.7	2,040.7
	87	3,049,949	975.9	3,125.3
	88	1,920,358	783.6	2,450.7
	89	5,400,734	1,475.5	3,660.3
	90	5,146,977	2,410.3	2,135.4
	91	1,826,791	1,409.5	1,296.1
	MEAN =	2,959,563.2	1,230.5	2,435.1
	STANDARD DEVIATION (SD) =	1,412,173.4	525.7	714.8
	1 SD UPPER =	4,371,736.6	1,756.1	3,149.9
	1 SD LOWER =	1,547,389.8	704.8	1,720.3
	2 SD UPPER=	5,783,910.0	2,281.8	3,864.7
	2 SD LOWER=	135,216.4	179.1	1,005.6

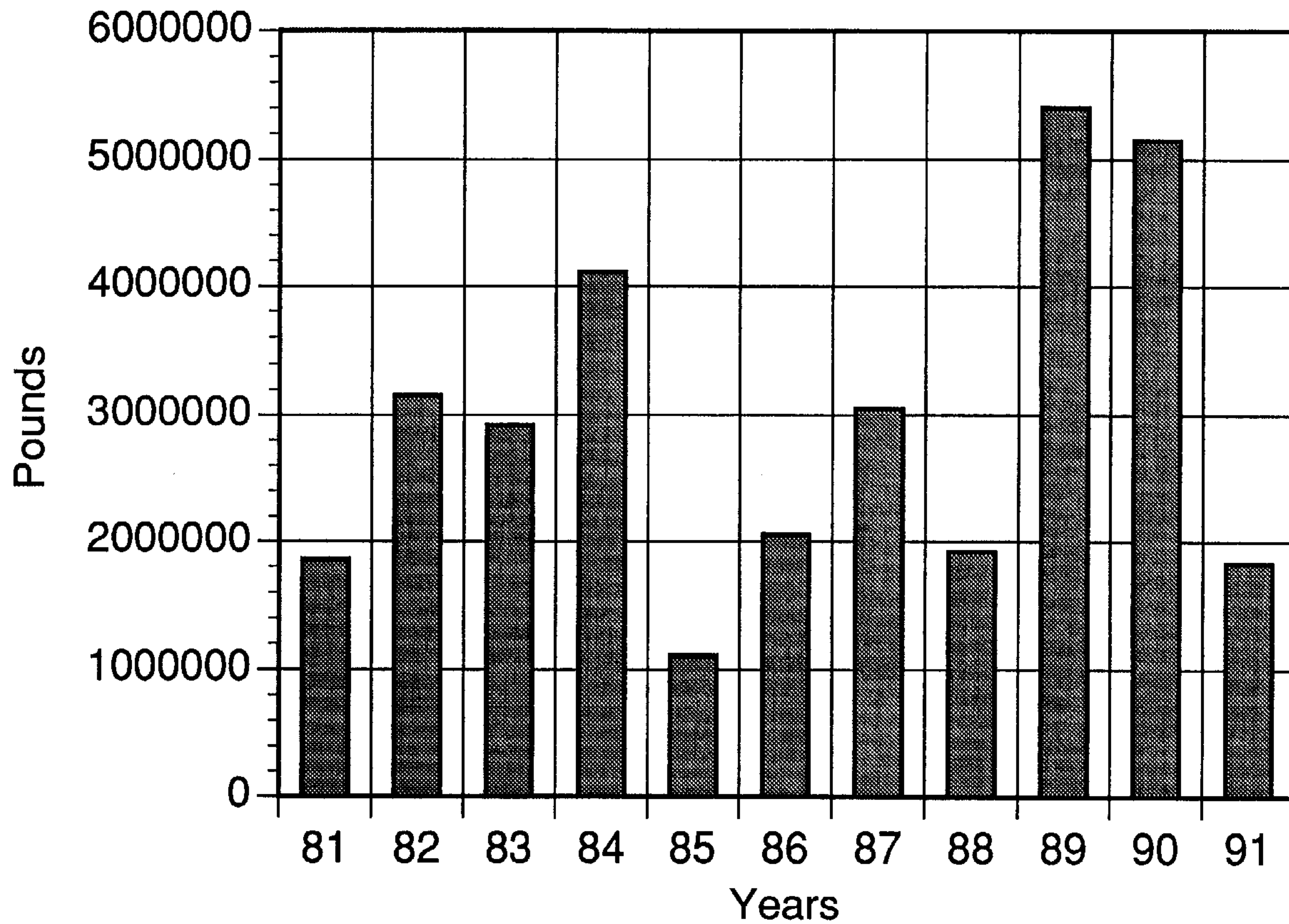


Figure 1. Rock shrimp annual catch off east coast of United States.

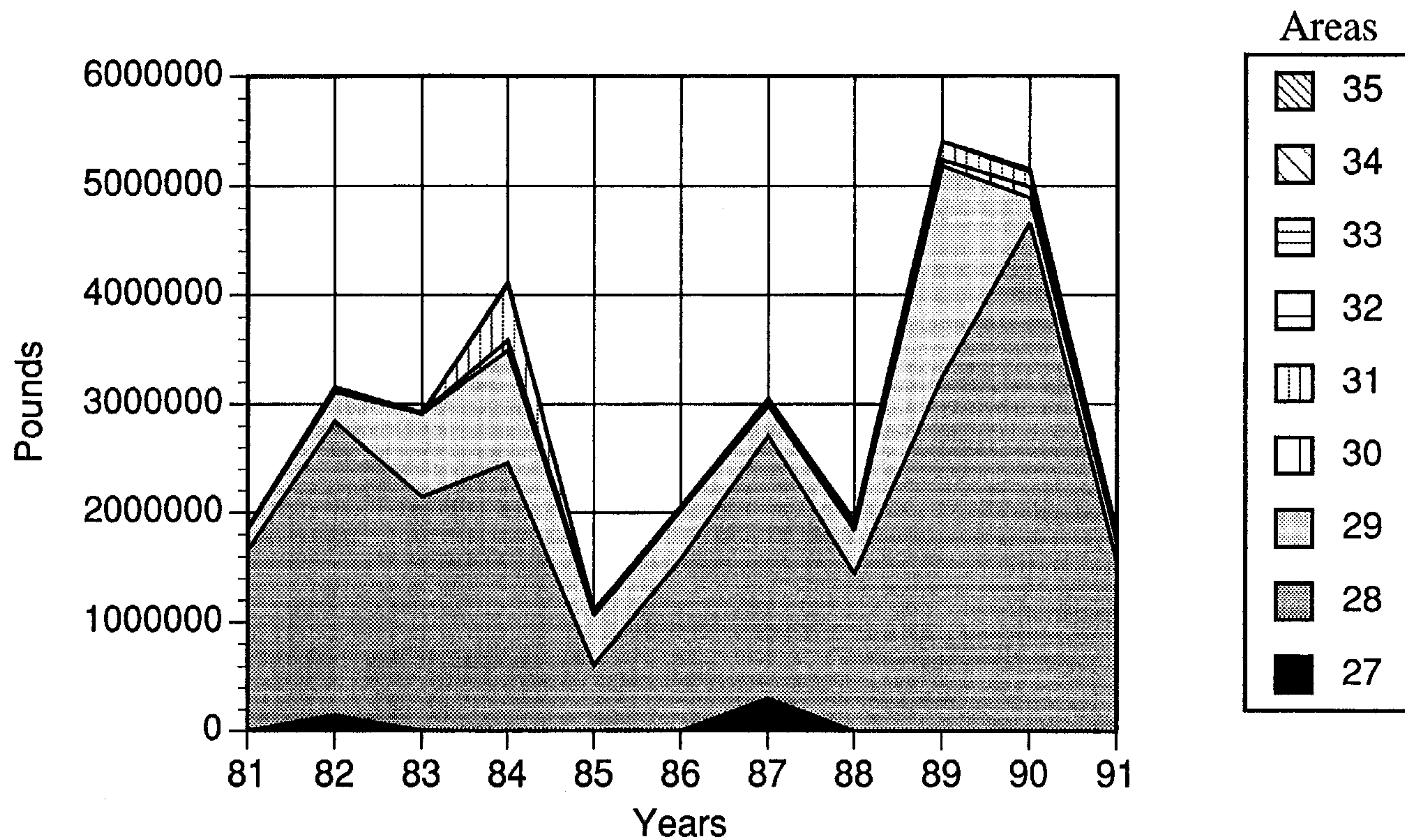


Figure 2. Rock shrimp annual catch by area off east coast of United States.

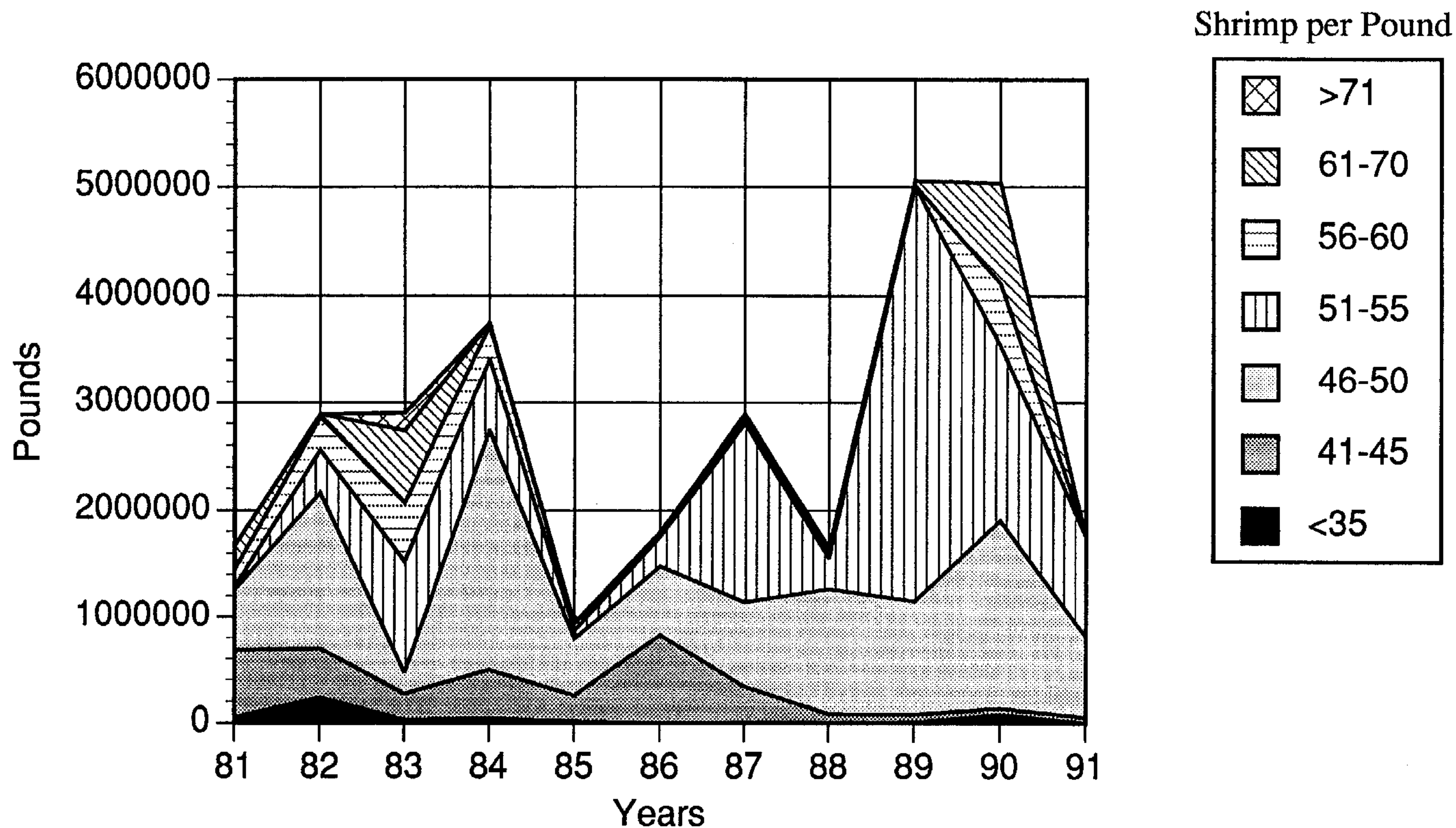


Figure 3. Rock shrimp annual catch by size off east coast of United States.

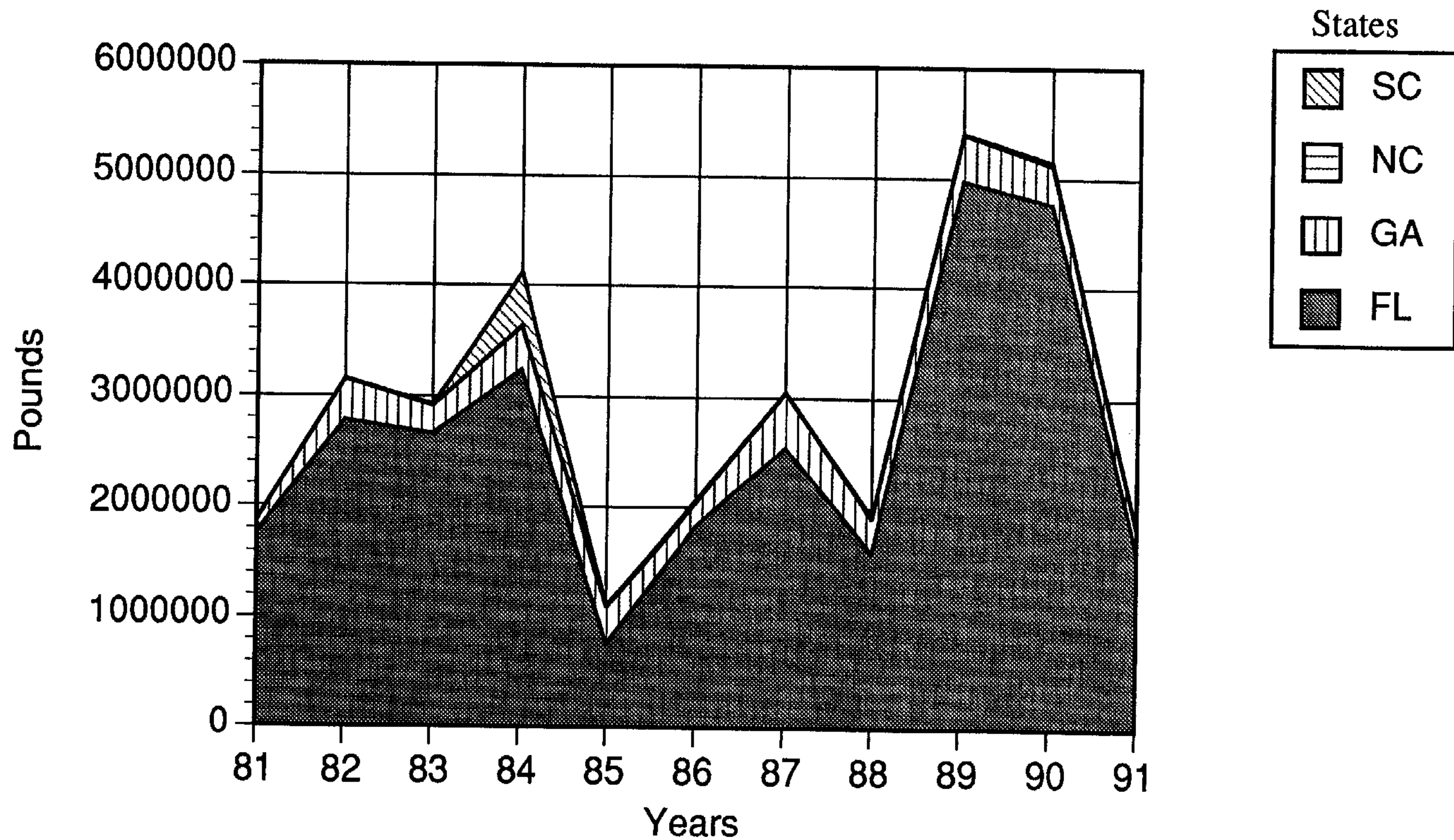


Figure 4. Rock shrimp annual landings by state off east coast of United States.

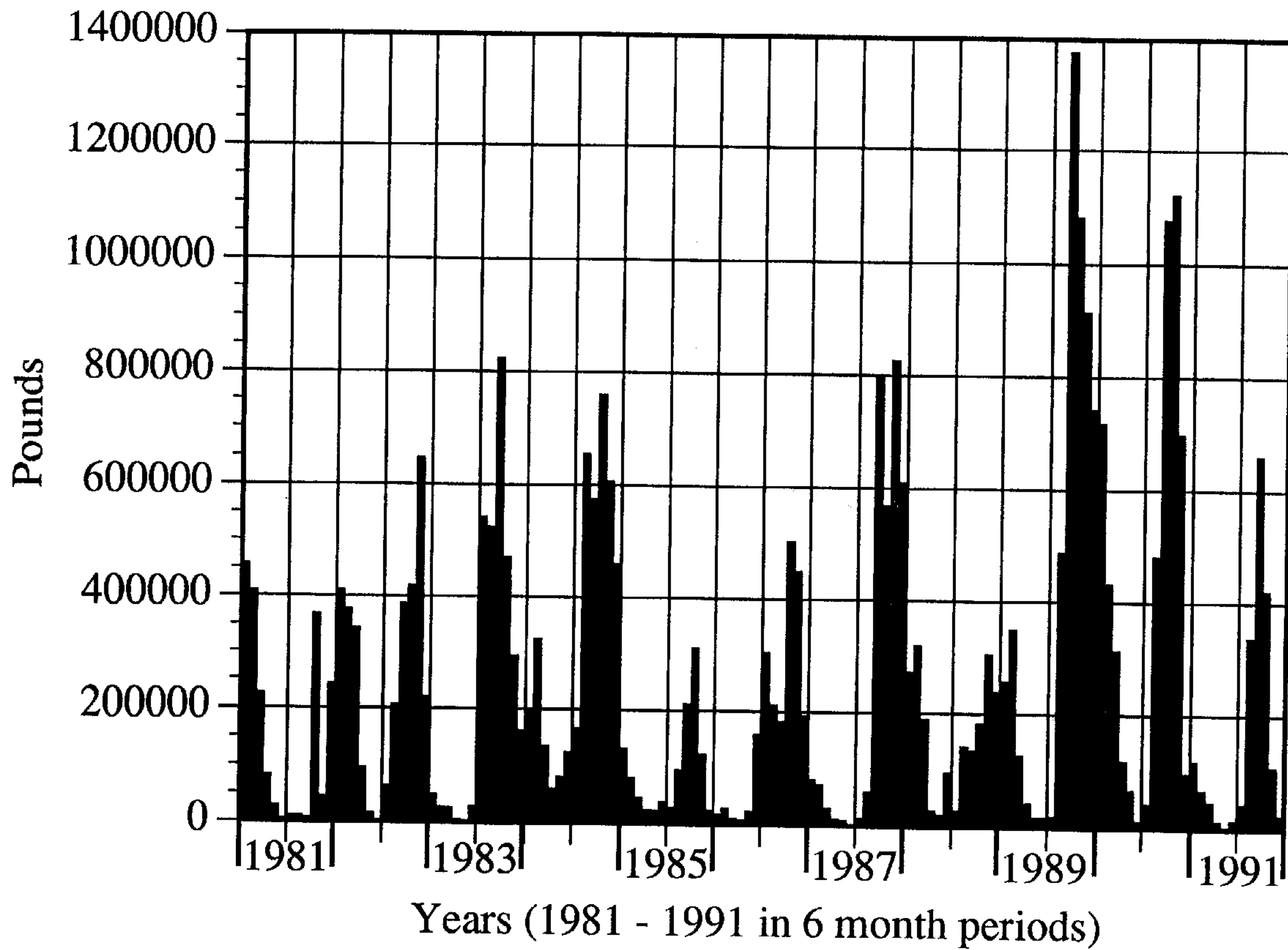


Figure 5. Rock shrimp monthly catch off east coast of United States.

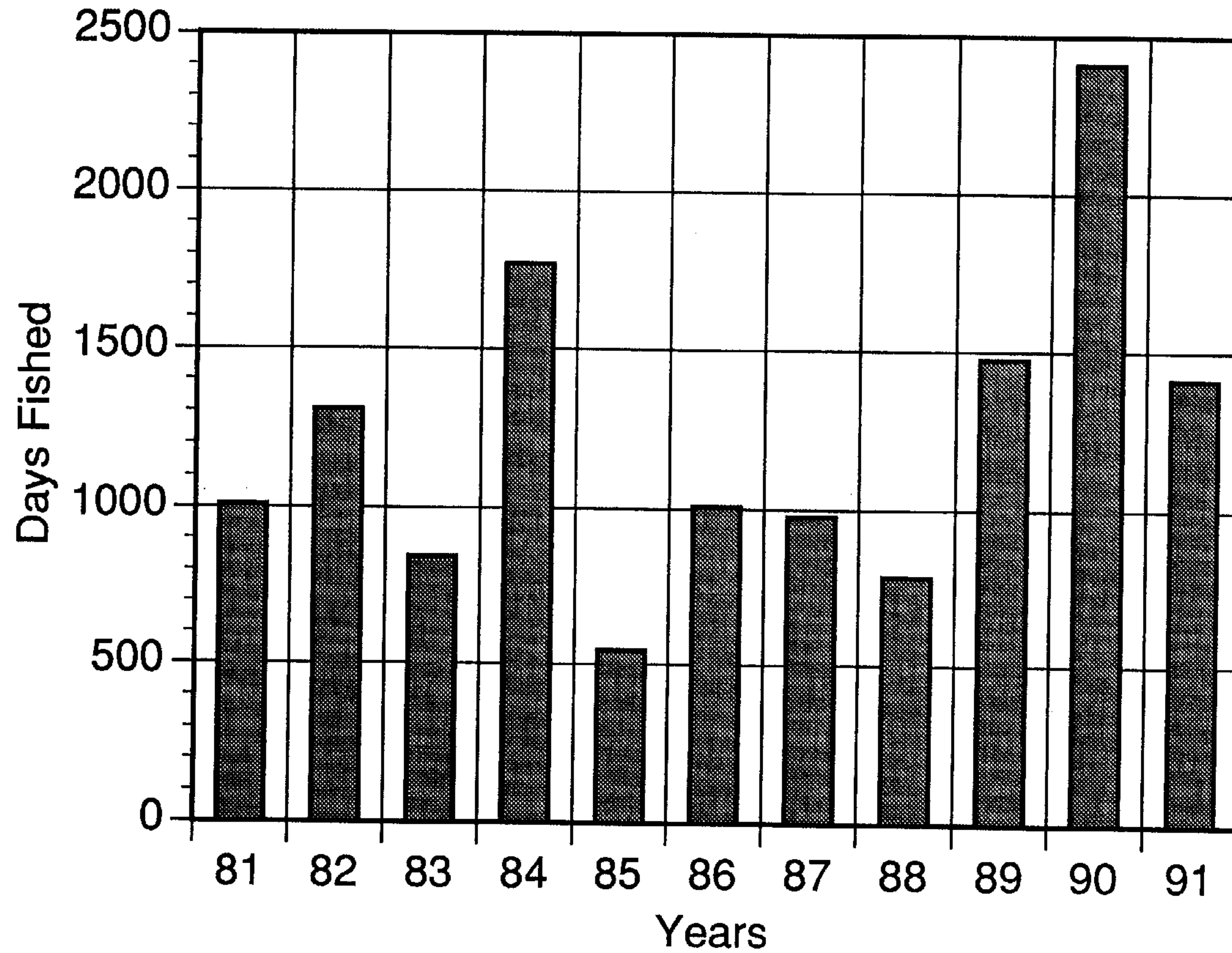


Figure 6. Rock shrimp annual effort off east coast of United States.

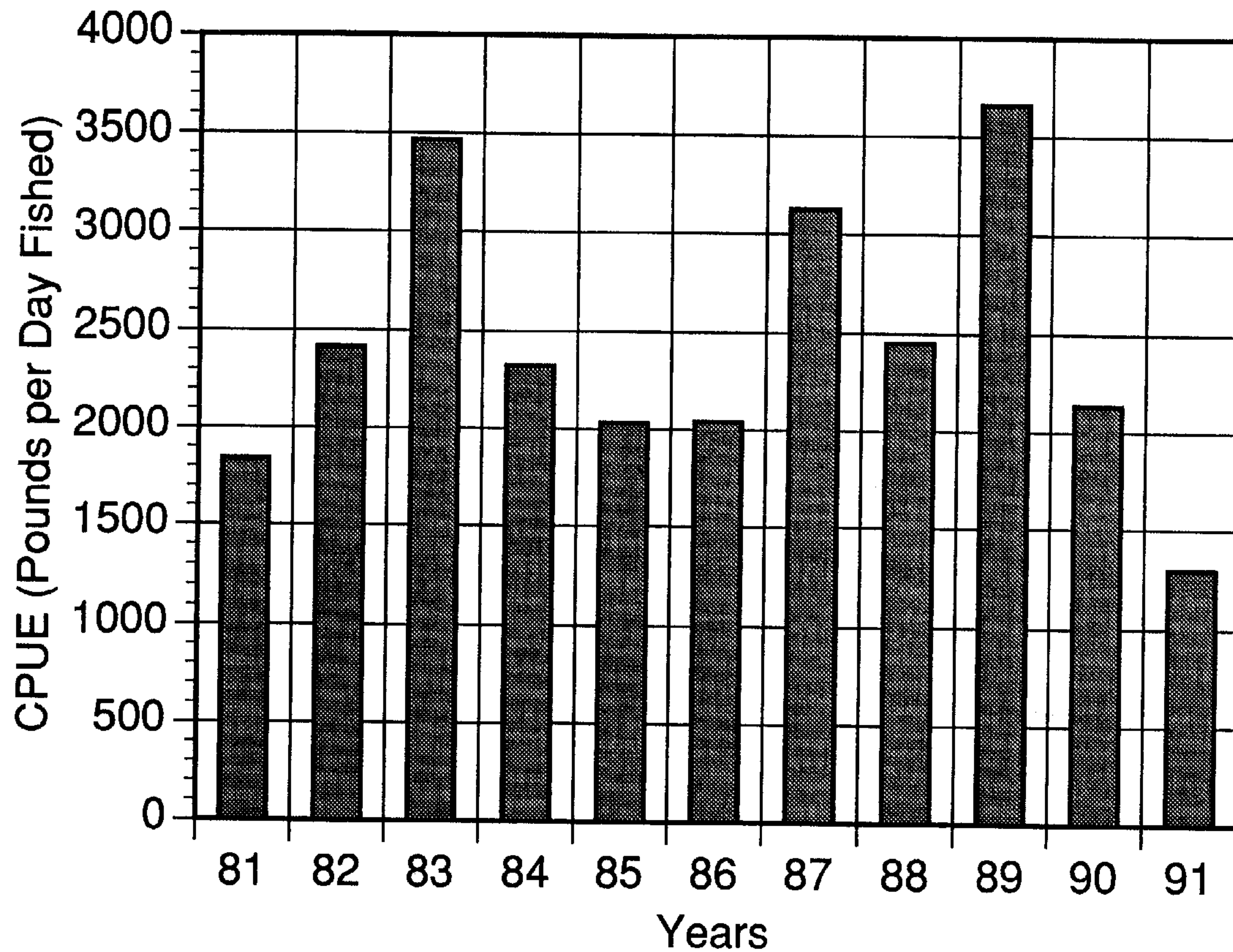


Figure 7. Rock shrimp annual CPUE off east coast of United States.

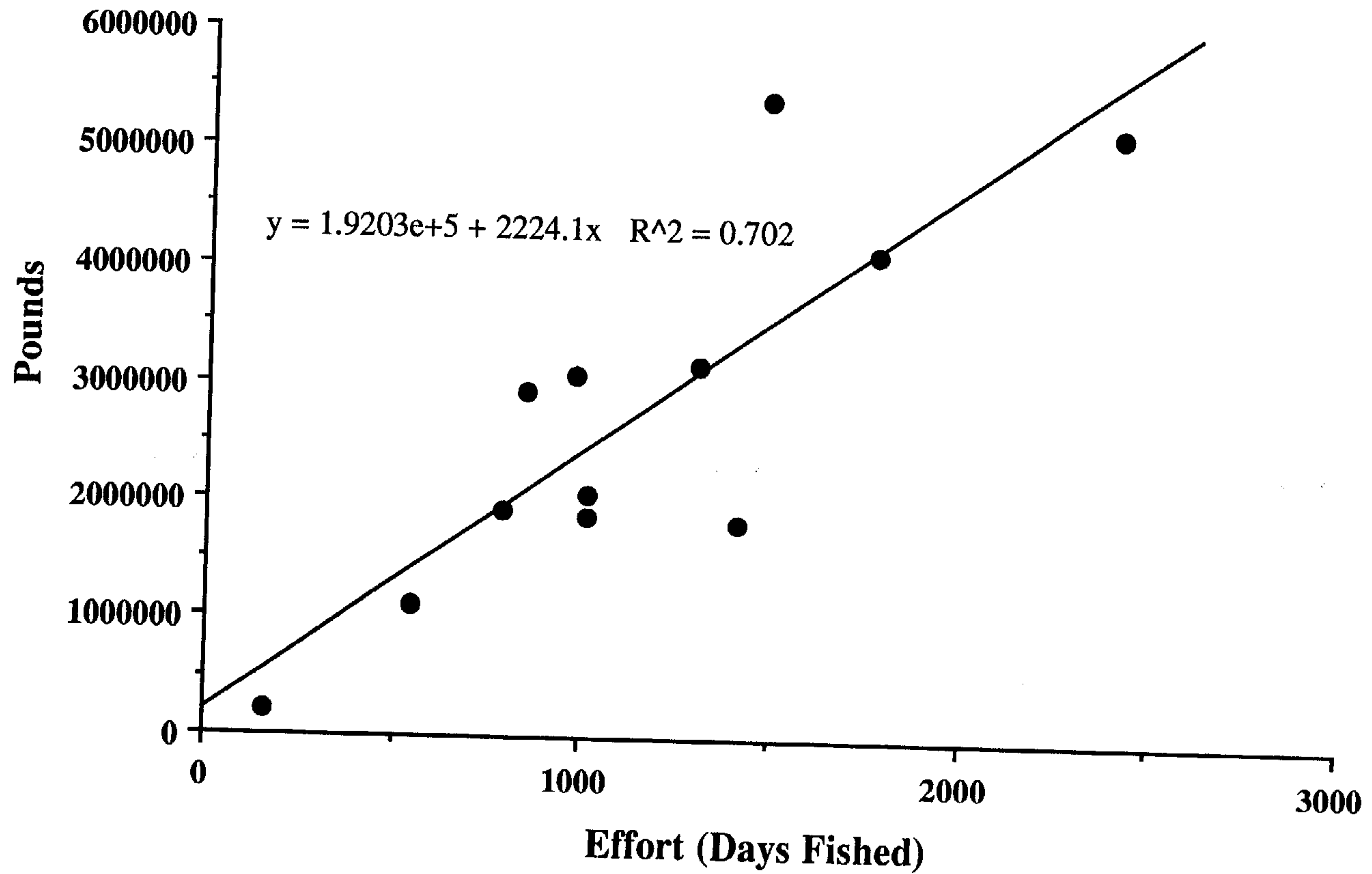


Figure 8. Relationship between annual catch and effort.

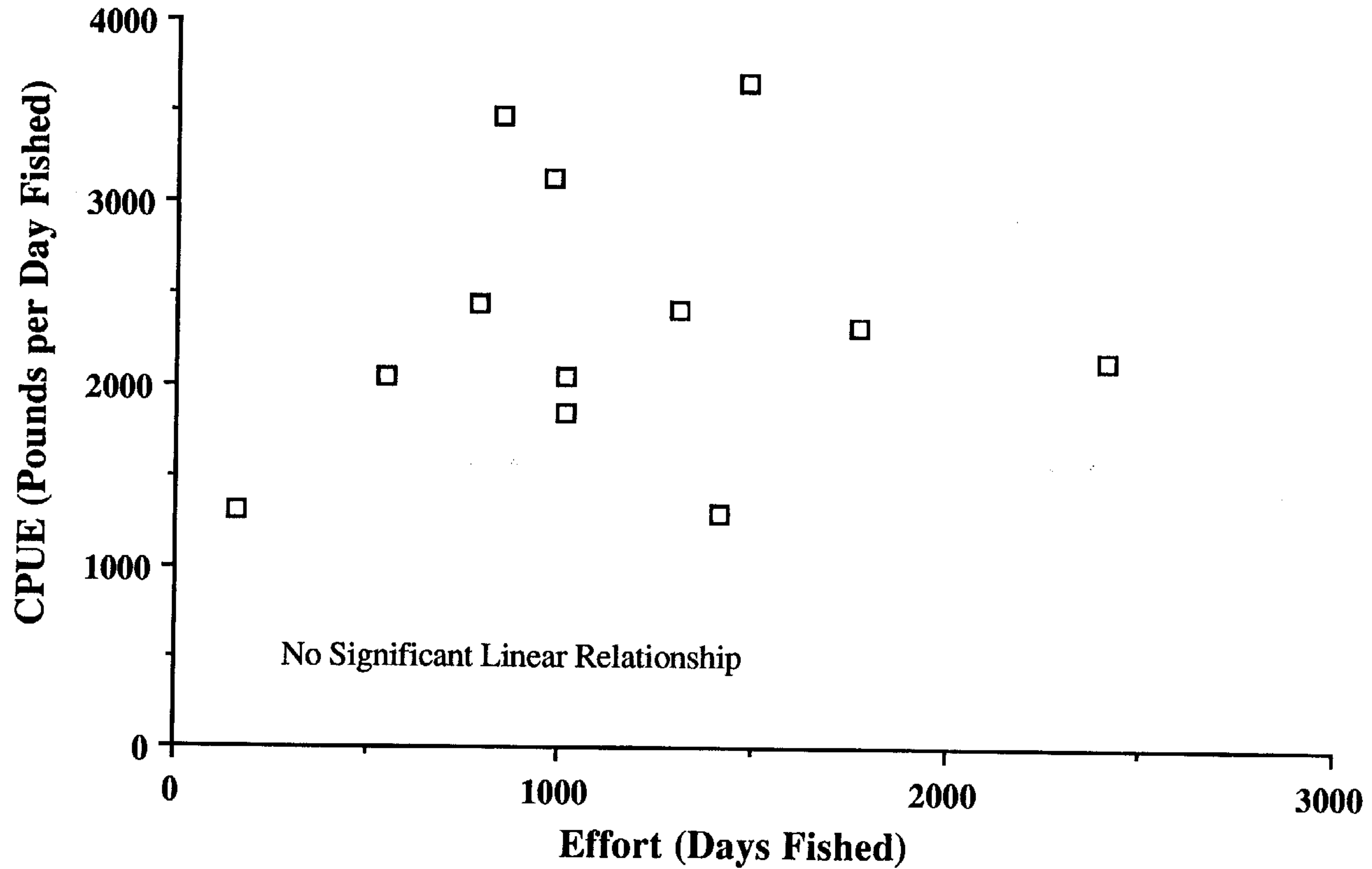


Figure 9. Relationship between annual CPUE and effort.

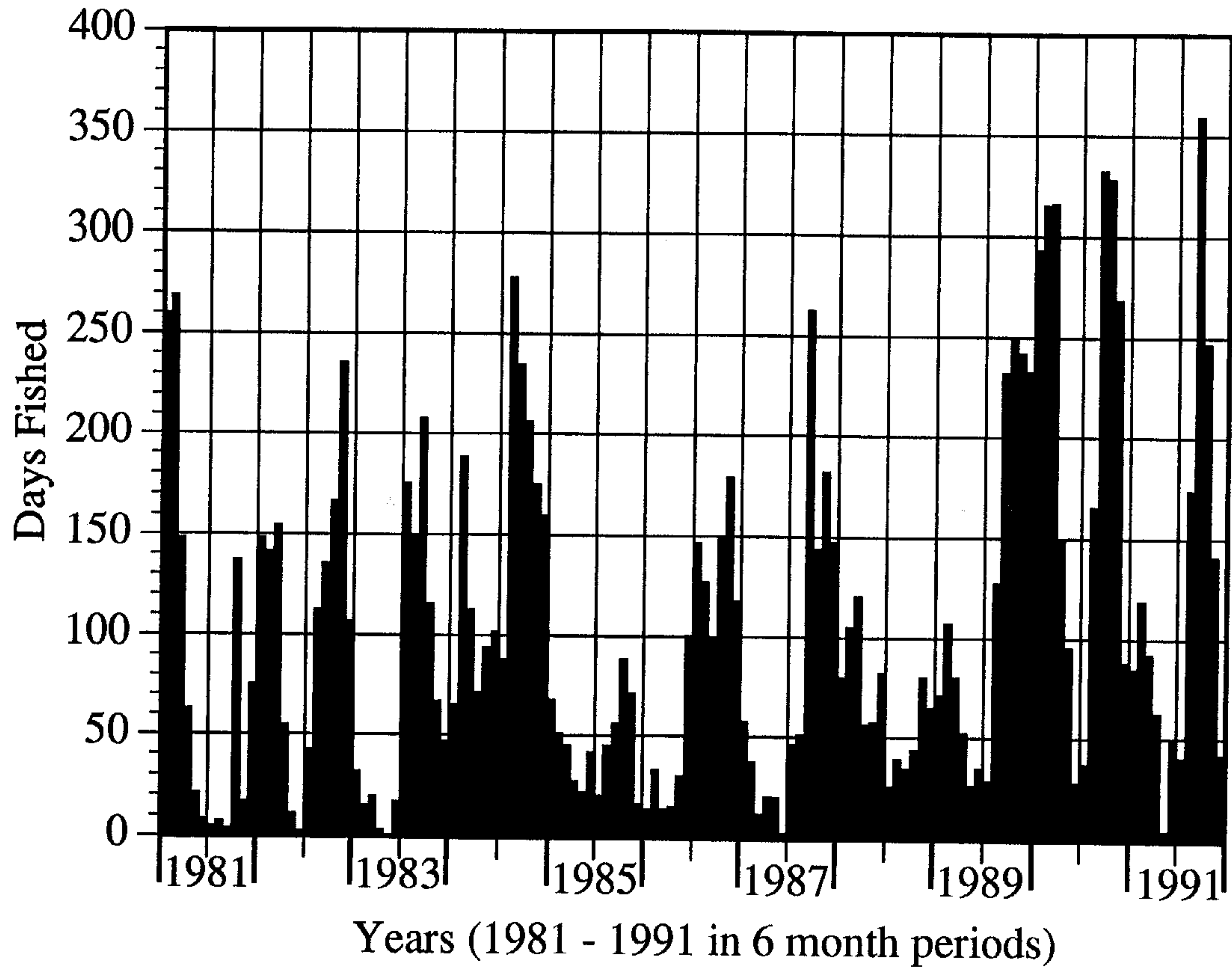


Figure 10. Rock shrimp monthly effort off east coast of United States.

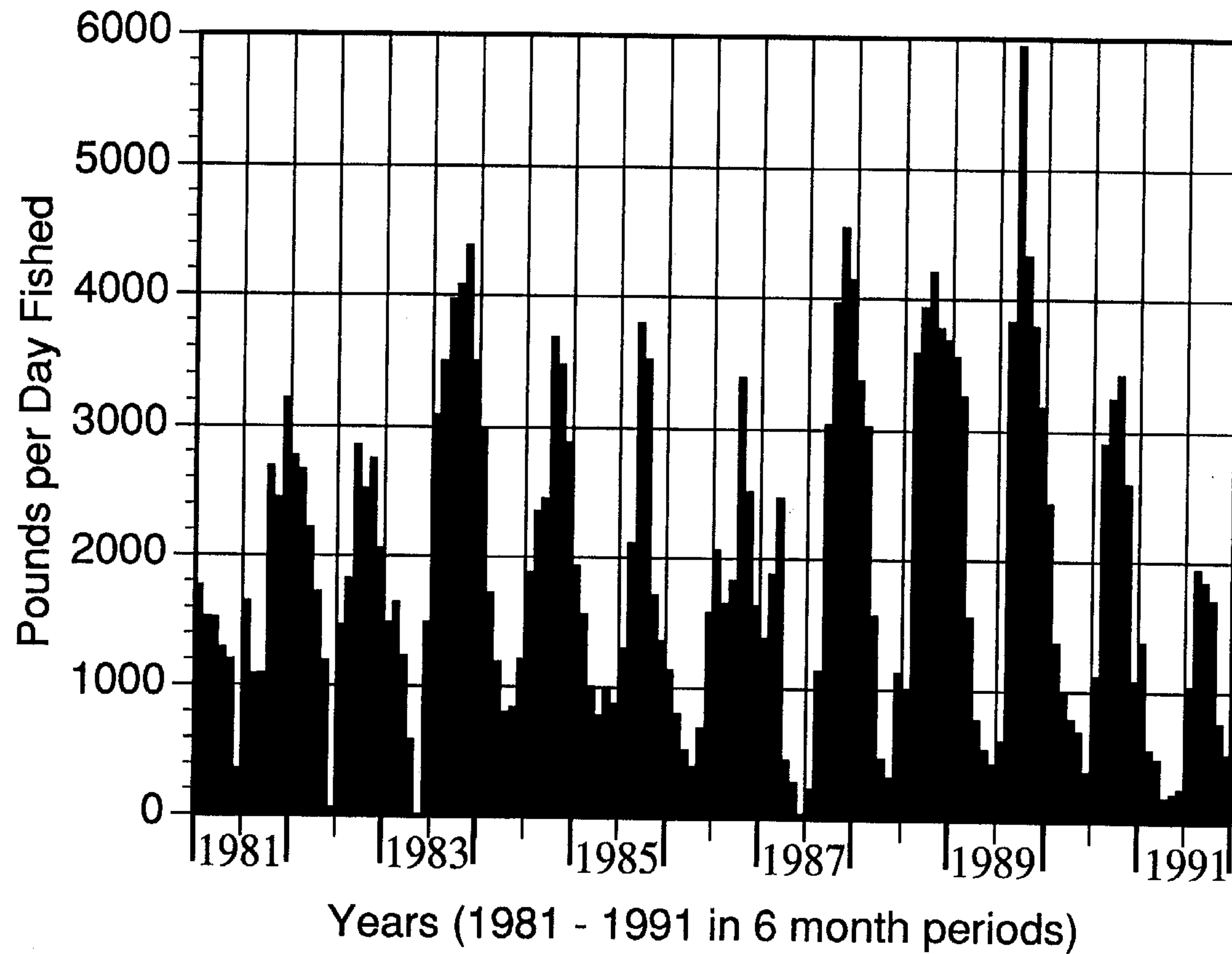


Figure 11. Rock shrimp monthly CPUE off east coast of United States.

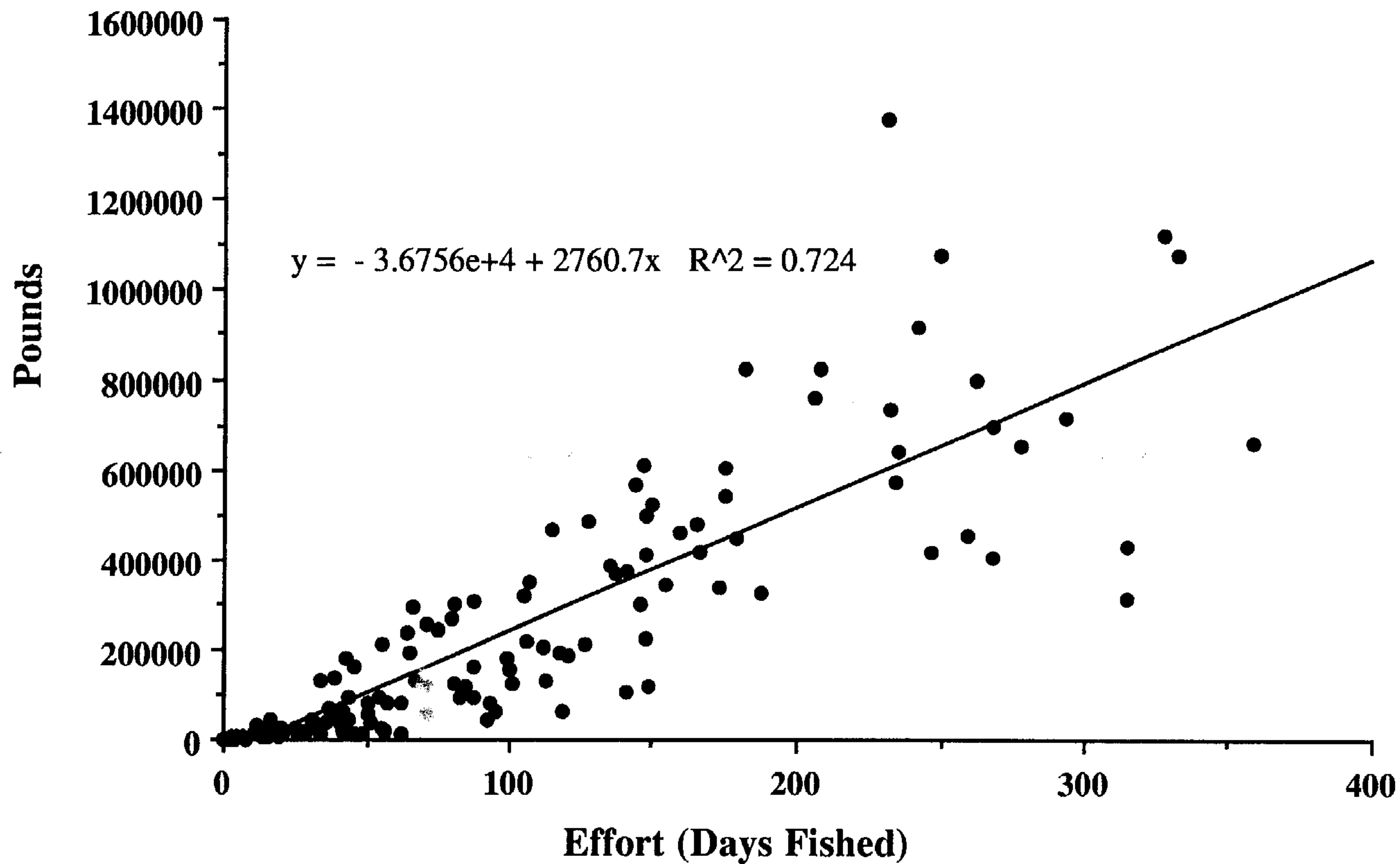


Figure 12. Relationship between monthly catch and effort.

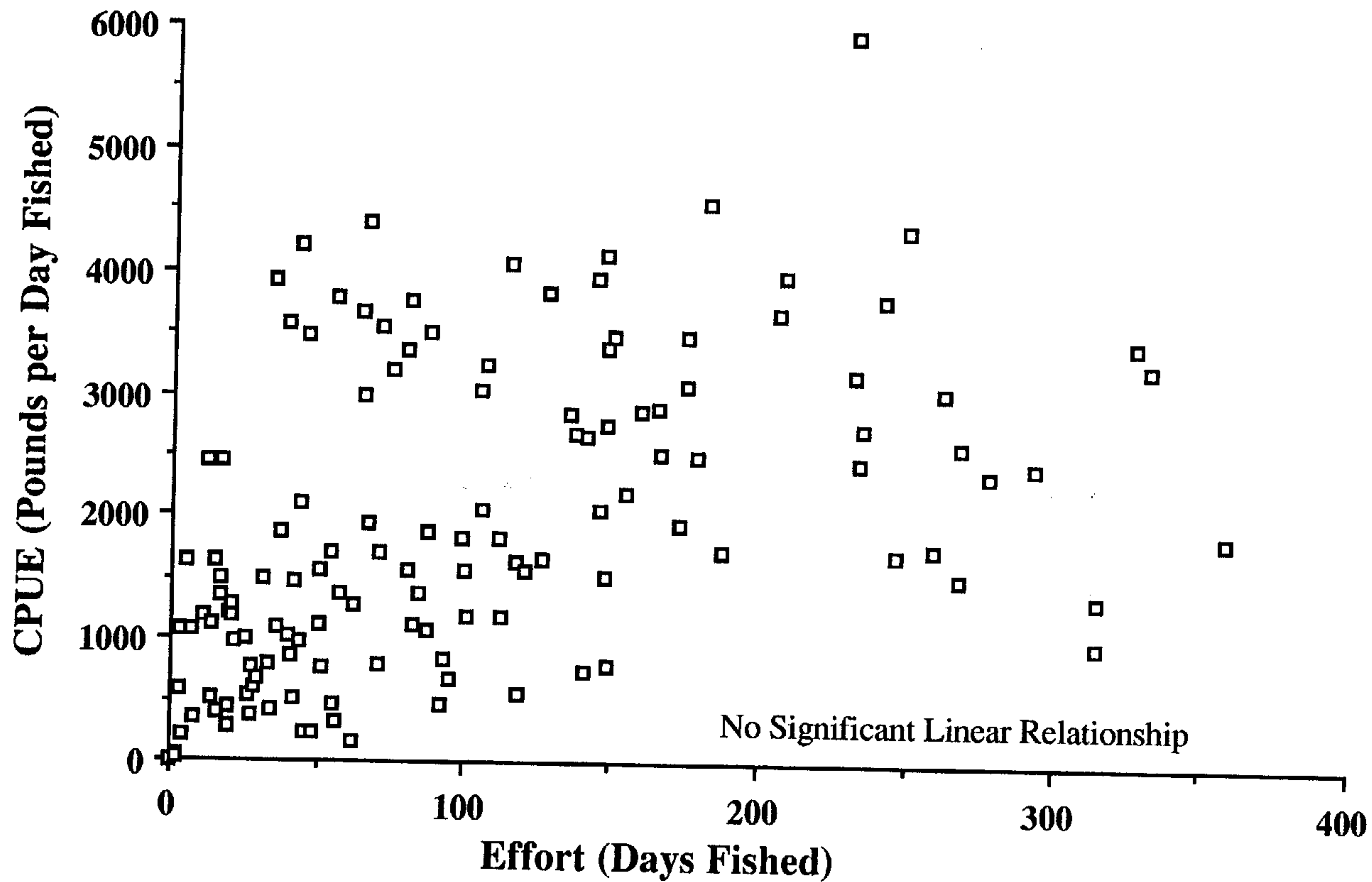


Figure 13. Relationship between monthly CPUE and effort.